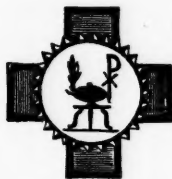


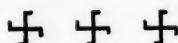
# RECORDS <sup>OF</sup> THE PAST

VOL. V



PART X

OCTOBER, 1906



## PAJARITO RUINS—THEIR ACCESSIBILITY

SIX months of continual riding, as Forest Ranger in the Jemez Forest Reserve, has enabled me to see only a portion of the vast number of archæological ruins in the Pajarito Region. Every new canyon explored, every new mesa opened by the extension of the system of Forest Service Trails, and each out of the way place chanced upon shows its treasures of cavate dwelling, communal house, watch tower or some relic of the cliff dwelling period.

Puyé, Tsankawi, Otowi, Navakwi, Tchirege (or more commonly called Pajarito), and the Frijoles have been brought to the attention of the public more than other regions, but to me there are sections far more interesting than these. Along the same general lines, of course, and possibly smaller in individual extent, there are groups of ruins within an easy day's trip that have apparently rarely if ever been visited by Americans. Here and there some Indian in hope of gain may possibly have done some rude scratching, but in the main these ruins are untouched. On the other hand the better known ruins show the signs of a good deal of modern research, or in other cases mere vandalism.

Some of these sections show an amazing number of ruins of all types in a remarkably small area.

About two miles South-west of Puyé are cliffs containing numerous cavate dwellings. These dwellings do not seem to be as regular in size as in the average cliff, but vary from the smallest to the largest sizes I have seen. In one of these dwellings I took refuge during

a stormy night with my saddle and pack horses, and found that it afforded ample room. It had been fenced in front, in years gone by, and used by sheep herders as a stable for their pack animals. This house is of course of unusual size, the average being either circular or in the shape of a rectangle, generally with a dome roof and 4 ft. to 5 ft. across, when rectangular, and only slightly longer in the greatest dimension.

The crests of the cliffs in question are in the form of a narrow mesa. This mesa is broken in 3 places, practically forming 4 small mesas. Two of these sub-mesas contain communal houses several hundred rooms in extent each. They are in unusually good condition and the rough hewn rectangular stones form heaps some 15 ft. above the surrounding ground. The shapes of the rooms and of the entire structure can easily be seen. They are even distinct enough to show without excavating that the structures were several stories in height, the lower story containing a much larger number of rooms than the one above it.

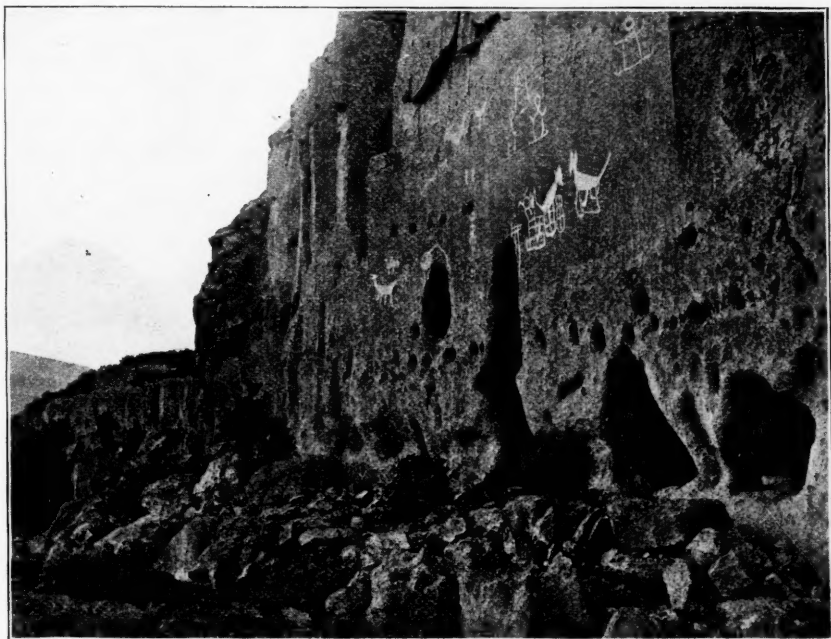
To the north of these houses on the first cliff, and easily accessible on horseback or on foot, are two additional large communal houses, while on the slight ridge to the south, to which even any class of vehicles can be driven, are two more houses. This gives a total of 6 large communal houses, uncounted smaller ones and watch towers, and hundreds of cavate dwellings within a very easy day's trip.

Another interesting feature of these dwellings is that they all seem in about the same state of repair, and not as at Otowi, and some of the other points showing a disparity of ages. This apparently indicates that a large part of these ruins, if not all, were inhabited at the same time. If so it is hard to picture even what a busy hive of activity this section must have been.

It is especially fortunate that this group is situated as near Espanola as it is for those who desire to make a quick trip to the ancient abodes. The Puye ruins, previously most visited, are on the Indian Reservation, and it is necessary to obtain permits to visit them, often necessitating a delay. All ruins in the Forest Reserve can be visited without permit, although excavating or any form of vandalism is strictly forbidden.

Unusual interest has been taken this year by the citizens of Santa Fe and Espanola in this region. Recognizing the value from a tourist's standpoint, the business men have started a movement to advertise this great section as well as to put the roads and trails in better condition. In addition to this the Santa Fe Archaeological Society has taken on new life, and has added many new names to the membership roll. Its membership embraces now practically all of the prominent people of the city, and a number are very much interested in the work.

Scores of parties have been formed to visit the cliffs, and many tourists have also availed themselves of the opportunity offered to



TYPICAL ENTRANCES, SHOWING PICTOGRAPHS

see the region. The number of people who have seen and will see the cliffs before the season is over far exceeds those of any previous year.

The coöperation of the Forest Service has been asked, and it is probable that a system of Forest Reserve trails will be made bearing in mind the sightseer and archæologist. The ranger's cabins will also probably be built this winter, and made large enough for the joint use of ranger and tourist.

At present a large portion of the ruins, both in the Reserve and in the Vigil Grant, north of the Frijoles Canyon is easily accessible by road or trail. This embodies the main portion of the country occupied by the Tewa tribes in this section.

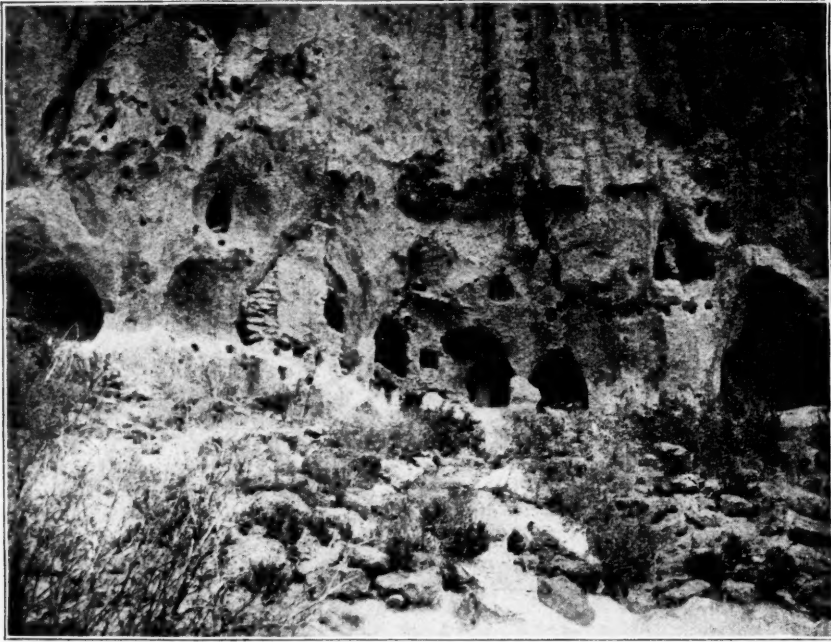
Rito de los Frijoles (Little river of the beans) and the Keres region south are only reached with difficulty. This region contains the Stone Lions of Cochiti, the Painted Cave and other points of interest. It is to this region that efforts are to be directed to make it more accessible.

The main entrance up to the present time has been down White Rock Canyon, along the Rio Grande to the mouth of the Frijoles. Then over the steep Navajo War Trail across the high Mesa and then down again into the Frijoles Canyon. This trail leads over lava beds and is dangerous and difficult for both the tourist and his animals.

A committee from the Santa Fe Society went over this trail with Professor Hewett and decided to put it in better repair for next season.

I have recently been looking over the country above, and have decided that a much easier trail is available across the tops of the Mesas. It will be no longer, better time can be made on it, it is not dangerous, and the traveler will pass several other ruins of interest. This will be reported to the Society in the near future.

Recognizing the fact that if this region is ever properly advertised to tourists, or known as it should be by archæologists, thousands



A SELECT DWELLING WITH ROOMS CONNECTED

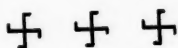
will visit it annually, there are numerous people who have made themselves familiar with parts of the region, and are ready to act as guides.

One can now secure conveyance at Santa Fe and drive to the ruins, or take the train to Espanola and go in from there, or still, if preferable, arrange with the Indian guides for horse or burro outfits. Espanola will enable one to go to the ruins and return in the same day, but few who have any interest in these wonders will be satisfied with such a short stay. A night or so spent around the cheery camp fire, where tales of the ancient race are told, will add much to the pleasure of the trip.

It is a matter of congratulation that the Forest Service is protecting these rich stores of archæology, and the tourist who makes a Western trip without a sight of this interesting region has in my opinion missed one of the best attractions in the West.

HUGH H. HARRIS.

U. S. Forest Service, Santa Fe, N. Mex.



### LIGHT FROM GEOLOGY UPON THE CROSSING OF THE RED SEA BY THE CHILDREN OF ISRAEL

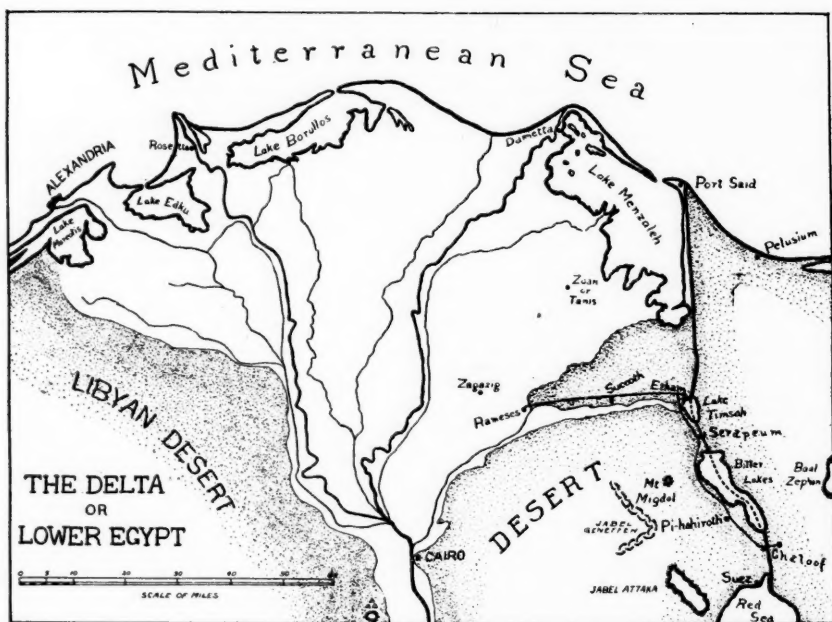
HAVING, during the last few years, been twice over the ground where the children of Israel are supposed to have crossed the Red Sea, and having gathered many facts, both new and old, bearing upon recent changes of land level around the eastern shore of the Mediterranean, I am impressed anew with the extent to which geological investigations both explain and confirm the account of that event given in the book of Exodus. The story as there told is remarkable in every respect, and not the least in the way it puts forward the secondary causes through which the way was opened for the deliverance of the people. In a literature written for religious purposes in which it was both natural and proper to throw into the foreground the direct agency of God, it is surprising that so much emphasis is laid upon the means employed by the Creator. It was indeed the Lord which "caused the sea to go back." But he did it "by a strong east wind," which blew all night, and "made the sea dry land." And again, in the song which recounts the event, it was by the "blast of his nostrils" that the waters were piled up. And when the waters came back to overwhelm the Egyptians it was God who "did blow with his wind that the sea should cover them."

Such reference to the secondary cause by which the event was brought about invites us to an examination of the physical conditions in which such a cause would produce the given result. In the plainest manner, therefore, it opens itself up to scientific inquiry.

The Gulf of Suez ends in a narrow point of shallow water extending a few miles north of the city. Where this inlet joins the main gulf, it is partially obstructed by a narrow bar, which is almost out of the water at certain stages of what may be called the tide, though it is not a real tide which affects the depth of the water, but, as is now well known, the wind. It was the surmise of Dr. Edward Robinson, who has been followed by many others, that the

place of the crossing was at Suez, and that this bar was the bridge by which it was effected at low water. But the bar is so narrow that it would be more of a miracle to get the host of Israel across in the time allotted than it would be to disperse the waters which submerge it.

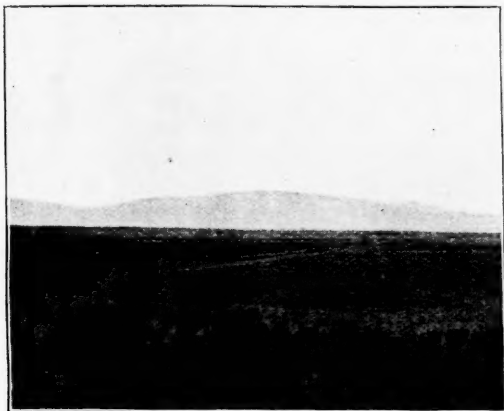
More careful study of the situation, and the increasing light shed upon it by geological investigations, have tended to shift the scene a few miles farther northward, where conditions are found which comport equally well with the position into which the Israelites were brought by their three-days' march, and at the same time



reveal conditions perfectly fitted to account for the whole description.

The shallow inlet projecting northward from Suez really occupies the lower part of a narrow depression, or we may call it channel (several miles of which are now dry) extending through to the Bitter Lakes, and thence on up to Lake Timsah, on which is the present city of Ismailia which probably occupies the site of the Etham of biblical times. The Suez Canal has taken advantage of this prolonged depression, and been able, by a shallow open cut, to connect the Gulf of Suez with the Bitter Lakes, and, following them up to Ismailia, has cut through the narrow ridge of land forming the watershed between the Gulf of Suez and the Mediterranean Sea. This ridge is





JEBEL ATTICA AND THE PLAIN IN FRONT

now 70 or 80 ft. above the sea-level, and has been the passageway between Africa and Asia which caravans and armies have used for thousands of years.

But the narrow depression north of Suez is only 15 or 20 ft. above the present sea-level. This fact brings us into the sweep of a geological theory which is of the greatest significance and highest probability. A subsidence of the land in this vicinity to the extent of 25 ft. would cause the water of the Gulf of Suez to cover the narrow depression extending through to the Bitter Lakes and beyond to the ancient Etham. That there was such a subsidence in recent geological times is evident from both direct and indirect evidence. The whole region around the eastern end of the Mediterranean Sea has been gradually rising during the present geological epoch. At Lydikia on the Syrian Coast, and at Gizeh, near the great pyramids in Egypt, there are abundant deposits containing sea-shells of existing species, from 150 to 300 ft. above sea-level. This is indubitable evidence that the land has been slowly rising. Moreover, the lower part of this depression is covered with recent deposits of Nile mud, holding modern Red Sea shells, showing that, at no very distant date, there was an overflow of the Nile through an eastern branch into this slightly depressed level. The line of this branch of the Nile overflow was subsequently used for a canal, and indeed is now so used, as well as for the railroad.

It is now more than 3,000 years since the date of the Exodus; so that the results required for the explanation of our problem would be produced by a rate of change in level with which geologists are perfectly familiar. Indeed, the best-informed members of our United States Geological Survey maintain that the changes of level about the Great Lakes of North America are such that in 3,000 years a part of the water which is now pouring over Niagara will be

diverted, by a natural flow, into the Mississippi Valley. To the geologist, therefore, the supposition which we are making is of the most commonplace and reasonable order. It is such a supposition as geologists are constantly and boldly making for the solution of the most insignificant problems which are presented to them. How much more is it legitimate to use it in explanation of historical statements so strongly credited as these in the book of Exodus are!

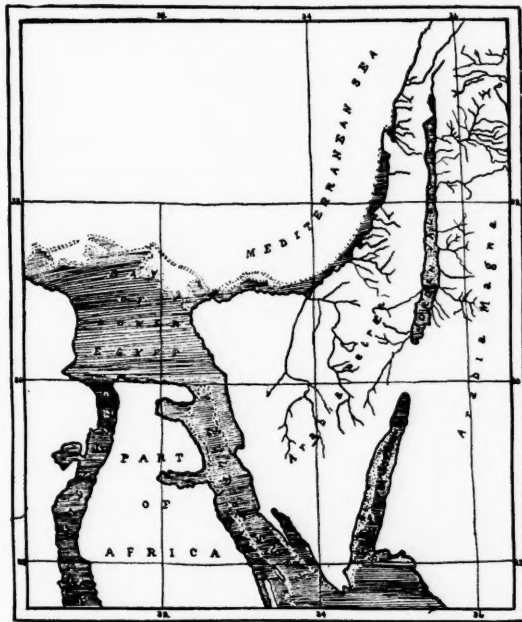
Now, a depression of 20 or 25 ft., existing, 3,000 years ago, over the eastern border of the Mediterranean Sea, would cause the water of the Red Sea to extend northward through the narrow valley which, from the point of view of physical geography, is a continuation of the Gulf of Suez, so that there would be a continuous line of unfordable water as far north as Etham. But for a distance of 10 or 12 miles between Suez and the Bitter Lakes the average depth of the water would be about 5 ft., a depth which could be easily reduced to nothing by the strong east wind spoken of in the biblical account.

The facts about the effect of wind upon water levels have always been more or less known, but recent observations place them now in a clearer light than they have ever been seen before. Among the most conclusive and satisfactory sets of observations upon this point are those which have been made by the officers of the United States Coast Survey upon the effect of wind upon water levels in Lake Erie. This lake is about 250 miles long, and its axis, running nearly northeast by southwest, is in line with that of the prevailing storms of the region. Now, it repeatedly occurs that a strong wind from the southwest lowers the water at Toledo, which lies at the west end of the lake, to the extent of 7 or 8 ft., while it piles it up to the same extent at Buffalo, which lies at the eastern end. A shifting of the wind from southwest to northeast produces the opposite effect, blowing it down at Buffalo and piling it up at Toledo, thus making, oftentimes within a short period, a difference in the depth of the water at these two ports of between 14 and 15 ft. Other instances, equally striking, might be given, but this is sufficient. It would take far less than a tornado to lower the water at the northern end of the Red Sea sufficiently to lay bare the shallow channel which we have supposed to have connected the Gulf of Suez with the Bitter Lakes, permitting any number of an organized host to cross to the other side. The advantage of this theory respecting the place of crossing, over that of Dr. Robinson, is that the crossing-place is here so broad that the numbers mentioned in Exodus could be easily taken across in a few hours, since the distance would be no more than 2 or 3 miles, and the channel could be crossed anywhere along a line 10 miles in length.

Turning now to the biblical account, we find that everything readily fits into this situation. At that time, the court of the Pharaohs was held at Zoan, about 30 miles northwest of Etham,



and about the same distance northeast of Rameses, the point from which the children of Israel set out upon their eventful journey. The course of the children of Israel from Rameses was eastward along the line of the freshwater canal, and their first camping-place, Succoth, a distance of from 10 to 15 miles. Their next camping-place was Etham, which, as already marked, was probably near the present Ismailia, at the head of what was then the northern projection of the Gulf of Suez.



MAP OF LOWER EGYPT AND PALESTINE  
WHEN SLIGHTLY DEPRESSED

So far they had not got beyond the reach of a flank movement by Pharaoh's army, that might cut across the desert and readily intercept them on the main road to Palestine.

But at this point there was a most remarkable and apparently suicidal diversion of the Israelites from their onward course. Leaving the eastward road to the promised land, they were, by divine direction, turned southward, and reached a camp which is described as "before Pi-hahiroth, between Migdol and the sea, before Baal-zephon." The exact locality of this camp cannot be definitely determined, but every condition suits the description a little over a day's march south of Ismailia, on the west side of the Bitter Lakes. Here there is a mountain prominence, admirably conforming to the

signification of the word "Migdol," (tower) upon the west, which separates a narrow, level margin along the Bitter Lakes from the wilderness which stretches westward to Cairo. So clear is the atmosphere, and so short are the distances in that region, that one traveling along the line of the railroad from Rameses to Etham can distinctly see both this tower-like projection of Jebel Geneffeh, about 15 miles away, and the peak of Jebel Attaka, rising to a height of several thousand feet, just back of Suez 15 or 20 miles farther. No description could better fit the conditions than that which is put, by the sacred writer, into the mouth of Pharaoh: "They are entangled in the land, the wilderness hath shut them in." Surely it could not but seem that, in the characteristic words of General Grant, when speaking of one



RAISED SEA BEACH, SOUTH OF THE PYRAMIDS, CONTAINING RECENT SHELLS

division of his army, "It is bottled up: its defeat is sure." From a military point of view, no move could have been more foolhardy than that of the children of Israel in marching southward between the perpendicular face of the monoclinical ridge of Jebel Geneffeh, on the west, and the projecting arm of the Red Sea, upon the east. From such a pocket, escape could be nothing less than miraculous. There was only this advantage, that they were temporarily protected from attack upon either flank, while their rear guard was compelled to defend only a narrow field.

Dr. Dawson and others would place the fourth encampment of the children of Israel some distance north of the present extension southward of the larger of the Bitter Lakes. But this is by no means



REMNANT OF EROSION NEAR PI-HAHIRATH

necessary, and does not fit the situation as does the locality a few miles farther south, opposite what is now the dry portion of the old arm of the gulf, and which was, as we have supposed, then covered only with shallow water. In making this supposition, no violence is done to the text of Scripture or to the necessities of the case. A vast army like the hosts of Israel at that time cannot encamp in one particular point, but are necessarily spread over a considerable territory. And we are not shut off from supposing that, in the adjustment of their camp, they had time to move to the more commodious and open plain that lies about half way between the Bitter Lakes and Suez.

Supposing the children of Israel to be in this position, with Jebel Geneffeh on the west, Jebel Attaka and the Gulf of Suez on the south, the shallow projecting arm of Suez separating them from the wilderness, and a mountain peak clearly visible, which may well be Baalzephon, on the east, and pressed, on the rear, by the advance guard of Pharaoh's army, the situation would seem to be desperate. It was not within the reach of the human mind, at that time, nor would it be at the present time, to calculate upon the deliverance which came. Not only were the forces of nature which were employed to effect it beyond the power of human control, but their action was beyond reach of human foresight. At this juncture it was revealed to Moses that the waters should roll back, and a way of escape be opened. We are told that "Jehovah caused the sea to go back by a strong east wind all the night, and made the sea dry land, and the waters were divided."

We have already spoken of the effect of a strong wind in lowering the level of the narrow body of water over which it blows. No



THE "CROWS' NEST" SOUTH OF THE PYRAMIDS, SHOWING THE RAISED BEACH

situation better adapted for the full effect of winds, in producing a change of water level, could be imagined than was found here. Even should we feel compelled to interpret strictly the word "east," the contour of the shore is such that the resultant of the force would be to move the whole body of water from the head of the gulf into the broader and deeper portions to the south, thus laying bare a broad isthmus over which an immense organized host could pass in a few hours' marching.

In conclusion, it is proper to call renewed attention to the extent to which this analysis of the biblical statement and of the physical conditions in which the history is located, confirm the account. The story fits the circumstances so perfectly, or, in other words, the conditions implied so correspond with the facts stated, that the history is supported by the strongest form of circumstantial evidence. It is not within the power of man to invent a story that would be so perfectly in accordance with the vast and complicated conditions involved in it, and which we find to be actually existent. The argument is as strong as that for human design when a key is found to fit a Yale lock. This is not a general account which would fit into a variety of circumstances. There is only one place in all the world, and one set of conditions in all history, which would meet the requirements. The story is true, and it has not been, to any great extent, remodelled by the imagination either of the original writers or of the transcribers. This is scientific proof. No higher can be found in the inductive sciences than such as is here presented. The story of Israel's crossing the Red Sea is history, and not the product of mythological fancy or legendary accretion.

GEORGE FREDERICK WRIGHT.

Oberlin, Ohio.

## PREHISTORIC VILLAGE SITE, ROSS COUNTY, OHIO\*

### [PART I]

**T**HE Baum Prehistoric Village site is situated in Twin Township, Ross County, Ohio, just across the River from the small borough of Bourneville, upon the first gravel terrace of Paint Creek.

The Paint Creek valley is drained by Paint Creek, a stream of irregular turbulence, flowing in a northeasterly direction, and emptying into the Scioto river, south of Chillicothe. The Valley, at the site of this village upwards of two miles in width, is surrounded on the east and west by high hills which are the landmarks of nature, but little changed, since the days of the prehistoric inhabitants.

Spruce Hill, Fig. 1, with steep slope covered with a dense forest, towers above the surrounding hills on either side. The top of this hill is made a veritable fortress by an artificially constructed stone wall, enclosing more than 100 acres of land. This fortress would no doubt furnish a place of refuge to those who might be driven from the extensive fortifications in the valley below, which are in close proximity to the mounds and village of those early people.

Looking to the south and east from the village site, one can see lofty hills rising in successive terraces, no longer covered with the deep tangled forest, but transformed by the woodman's axe, and now under cultivation, producing the golden corn, which is our inheritance from primitive man who inhabited the Valley of Paint Creek many centuries ago.

The village extends over 10 acres or more of ground, which has been under cultivation for about three-quarters of a century. Almost in the center of this village, near the edge of the terrace to the west, is located a large square mound. This mound and the earthworks which are directly east of it, have been known since early times as the landmarks of the early settlers in this section of Ross county. The mound was first described by Squier and Davis in 1846, in their *Ancient Monuments of the Mississippi Valley*, page 57, where they give a description and drawing of these works. However, Squier and Davis do not mention the fact that a village was present, nor that they knew of the village, as is shown by their description.

In 1897 Dr. Loveberry, under the direction of Prof. Moorehead, examined a small portion of the village. Prof. Moorehead's conclusions are found in Vol. 7, page 151, of the publications of the Ohio State Archaeological and Historical Society.

\*For the illustrations in this article we are indebted to the Ohio State Archaeological and Historical Society. For complete report on this Mound we would refer the reader to Mr. Mills' Monograph entitled *Baum Prehistoric Village*.

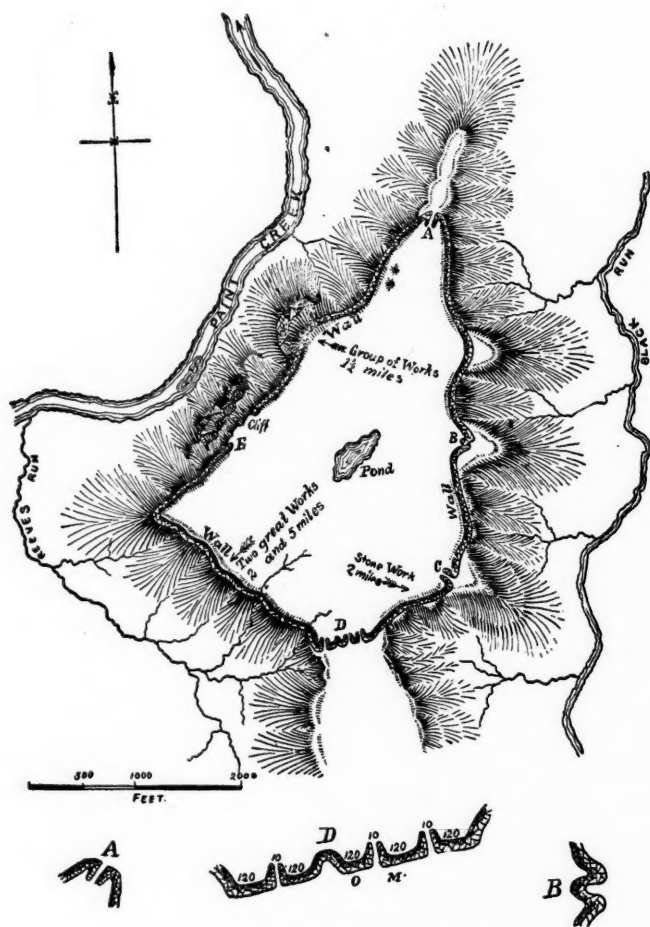


FIG. I.—MAP OF SPRUCE HILL

In the following pages I give a detailed account of the work of 3 seasons in the village, bringing to light 49 tepee sites which were more or less the permanent abode of the dwellers, 127 burials which surrounded the tepees and 234 subterranean storehouses, in which were stored the winter supplies and which were afterwards used for refuse pits.

During the summer of 1899, I examined a section of the village which lies directly south of the mound, extending the work to the west, and finally ending the work of the season directly north of the mound. During the summer of 1903, I examined a large portion of the village directly east of the mound, and during the summer of 1902, sections were examined northeast of the mound, extending along the edge of the gravel terrace, directly southeast of the mound.



The examination of these various sections was made to discover, if possible, the extent of the village, as well as to ascertain the mode of life in the various sections, and whether the same people inhabited the village in all its parts.

The land upon which this village is situated has been owned by the Baums for more than three quarters of a century. At the present time the land upon which the village proper is situated is owned by Mr. J. E. Baum and Mr. Pollard Hill, and through the kindness of these gentlemen, I was not in any way restricted in my examination of the village; in fact, they assisted me in many ways to make the work pleasant and profitable. About three quarters of a century ago, Mr. Baum's grandfather cleared this land, which was then covered with a growth of large trees of various kinds, such as the black walnut, oak, sycamore, and ash, and it has practically been under cultivation ever since. The top surface consists of from 12 to 36 in. of leaf mould, and alluvial deposit, which overlies a thin stratum of compact clay. Directly beneath this clay of hardpan is found gravel.

During the entire examination of this village, something less than 2 acres of ground was dug over, and examined inch by inch by the aid of the pick, spade and small hand trowel, bringing to light the habitations and burial places of these early people.

No one living in this section, not even those cultivating the soil for the three quarters of a century mentioned, knew that the remains of a buried city of a prehistoric people lay only a few inches beneath the surface. As the examination progressed it was evident that a few pages, at least, of the history of remote time, were being revealed in the deep pits, which served as subterranean storehouses for the early agriculturists. A few more pages were brought to light when deep down in the clay, the burial grounds for each family were discovered, and still a few more pages when the tepee, with its fireplace, stone mortars, implements and ornaments, lying in profusion upon the floor of the little home, partially told in silent language of the great drama of life, enacted by those early people.

I herewith present a drawing, Fig. 2, of a portion of the village farthest to the northeast of the mound, which shows the site of a large tepee, the largest found during the explorations and, perhaps, the most interesting in this, that this tepee was never changed and always occupied the exact ground upon which it was originally built, while in many other instances the tepee was shifted from place to place, even occupying the ground used for burial purposes, and the deserted tepee site afterwards being used for the burial of the dead, or for subterranean storehouses. As I have stated, this tepee was the largest found in the village; of oblong construction and measuring upwards of 21 ft. in length by 12 ft. in width inside of the posts. The posts were large, as shown by the post molds, and consisted of 21, set upright in the ground, the smallest being 5 in. in diameter and the largest 9¼ inches. On the inside 7 other posts similar in size to the outer

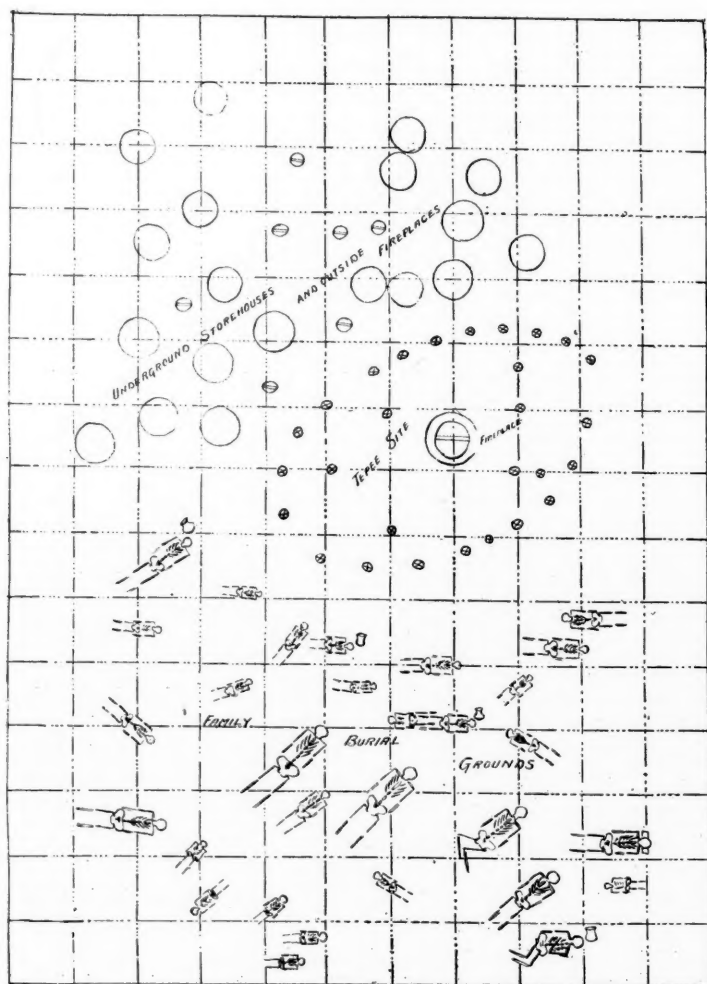


FIG. 2—TEPEE SITE, SURROUNDED ON ONE SIDE BY THE BURIAL GROUND AND ON THE OTHER BY UNDERGROUND STOREHOUSES

ones were promiscuously placed, presumably for the support of the roof. The posts for the most part consisted of the trunks of small trees, with the bark attached, placed in the ground. The imprint of the bark was quite visible, but the trees all being young it would be impossible to identify from the bark the kind of trees used in the construction of the tepee. The posts were made the proper length by the use of fire, and no doubt the trees were felled by fire, for at the bottom of the post molds charcoal was invariably found. The covering of the tepee evidently consisted of bark, grass or skins, as no in-

dications were found pointing to the use of earth as a mud plaster in the construction of the sides or top. The fireplace was placed in the center of the tepee and was about 4 ft. in diameter, 6 in. deep at the center and 3 in. deep at the edge, and had very much the appearance of having been plastered from time to time with successive layers of clay. The earth beneath the fireplace was burned a brick-red to the depth of 8 in. The original floor of the tepee had been made fairly smooth, but almost 6 in. of earth had little by little and from time to time been placed upon the floor. This earth had scattered through it implements and ornaments, both finished and unfinished, polishing stones, broken pottery, hammer stones, a large stone mortar, and

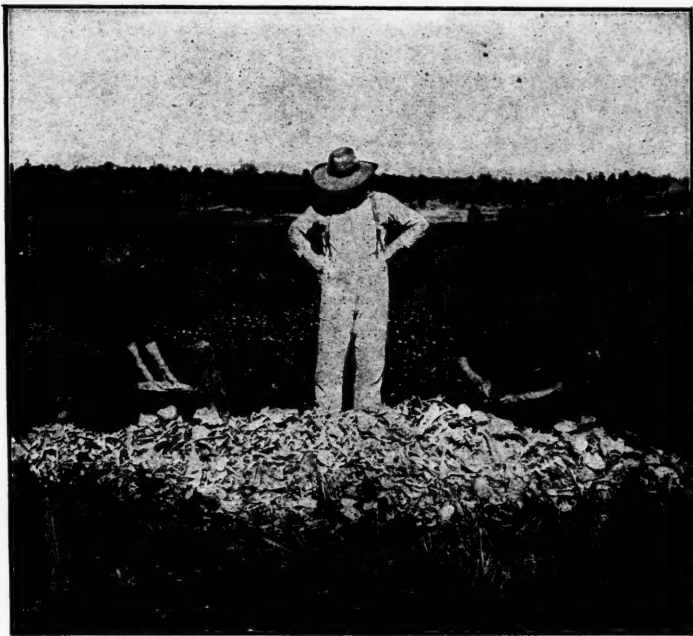


FIG. 3—ANIMAL BONES, MUSSEL SHELLS, BROKEN POTTERY, MORTARS, HAMMER STONES AND IMPLEMENTS OF BONE, STONE AND SHELL TAKEN FROM THE REFUSE PITS

many animal bones, especially of the deer, raccoon, bear, and wild turkey. As the animals named were most likely killed during the winter season, one must infer that the tepee was the scene of domestic activities during the winter, and that during the spring, summer and autumn the preparation of food was mostly done outside of the tepee at the large fireplaces marked upon the drawing (Fig. 2). However, the tepee described above is not typical of the village as far as size and shape and surroundings are concerned. The average

tepee is about one-half the size and invariably circular in form, and the posts used in their construction much smaller. The inside of the tepees are practically all the same. The surroundings of the tepee, such as the subterranean storehouses and the burial places, depend upon the size of the tepee. Surrounding the large tepee just described to the south was the burial ground where 30 burials were unearthed, the largest in the village. Of these burials 20 had not reached beyond the age of adolescents, showing that 66 2-3 per cent of the family group never reached the adult age. Fourteen of the 20 were under 6 years of age, showing that the mortality among small children was very great, being fully 70 per cent, not taking into account the 4 small babies found in the refuse pits which surrounded the tepee. The mortality of the young under the adult age in this family is greater than in any other individual family discovered in the village. Out of 127 burials unearthed in the village, 74 were under the age of 16, showing that fully 58 per cent of the children never reached the adult age. Of the 74 children under the age of 16, 56 were under the age of 6 years, showing that fully 75 per cent of the children born to these early peoples died before they attained the age of 6 years, not taking into account the 24 very small babies found in the ashes and refuse in the abandoned subterranean storehouses in various parts of the village.

The burials of this wigwam group present another interesting feature, found in only one part of the village, that of placing perfect pieces of pottery in the grave. Four burials representing 5 individuals, had each a pottery vessel placed near the head. All were carefully removed, but were more or less broken by freezing. The vessels have been restored and are on exhibition in the museum of the Society. Two of the vessels were placed with adults and each contained a single bone awl made from the shoulder blade of the deer; a few broken bones of the deer and wild turkey were found in one, and quite a number of mussel shells with a few bones were found in the other. The other two vessels were placed in the graves of children. One with a double burial, as shown in Fig. 2, a few broken bones of the wild turkey were found in the vessel, together with two mussel shells worked into spoons. The vessel was placed near the head of the older child, whose age would not exceed 4½ years. Two large bone awls made of the heavy leg bones of the elk were placed outside of the vessel and near the head, while in all the other burials where pottery was found, the awls were placed inside of the vessel. The other vessel contained bones of fish and a few small mussel shells, together with an awl made from the tibiotarsus of the wild turkey.

Another interesting feature of one of the burials of this group and which was not found in any other section of the village, was the finding of the fine-grained sand-stone slab, 19¼ in. long by 5 in. in width by 1 in. thick placed under the head of the skeleton. The slab had the appearance of having been water worn, but had received an additional polish by rubbing, the effect being noticeable over the en-

tire surface of the stone. One side is perfectly plain; the other side, finely polished, contains three indentations about  $\frac{1}{8}$  in. deep, and  $\frac{3}{4}$  in. in diameter.

Another feature of this interesting group is the finding of a few copper beads associated with shell beads in one of the burials. This find is the only instance where copper was found during the entire exploration in the village. However, it shows that the denizens were familiar with and possessed this very desirable metal.

The refuse pits surrounding the tepee to the north were perhaps the most interesting in the village, for here abundant evidence was found showing that the refuse pits were originally intended and used for a storehouse for corn, beans and nuts, and perhaps for the temporary storage of animal food, etc., and afterwards used as a receptacle for refuse from the camp. For some time I was of the opinion



FIG. 4—HEADLESS SKELETON, WITH A LARGE POTTERY VESSEL PLACED AT THE HEAD OF THE GRAVE

that the large cistern-like holes were dug for the express purpose of getting rid of the refuse, but as the explorations progressed I soon discovered their real purpose by finding the charred remains of the ears of corn placed in regular order on the bottom of the pit; and I was further rewarded by finding pits in various sections of the village contained charred corn, beans, hickory nuts, walnuts, etc., which had been stored in the pit and no doubt accidentally destroyed. Since completing my examination of the Baum Village I examined the Gartner Mound as well as the village site which surrounded the mound, and find that the two villages had very much in common. The family



grouping and the subterranean storehouse were identical in every respect with those at the Baum Village, therefore, I quote from my report upon this village site, Vol. 13, page 128, publications of the Ohio Archæological and Historical Society, including a photograph of explorations at Gartner's showing the close proximity of the pits and the large number exposed at one time:

The refuse pits, which are so abundant in the villages of the Paint Creek valley, were present in great numbers and distributed over the village site surrounding the habitats of the various families. Fig. No. 5 shows 10 of these pits open at one time. During the examination in the village, more than 100 pits

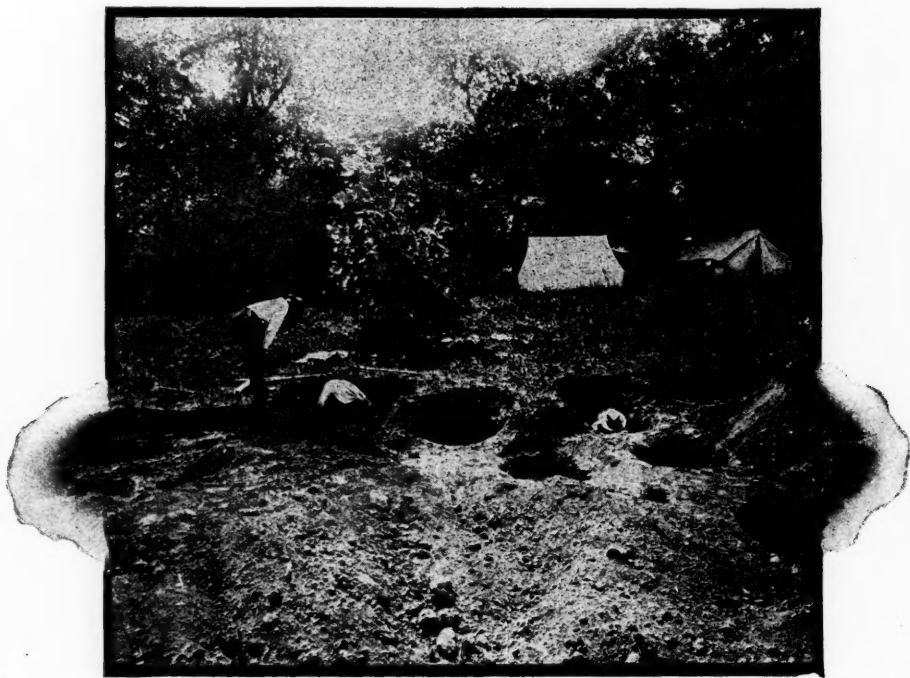
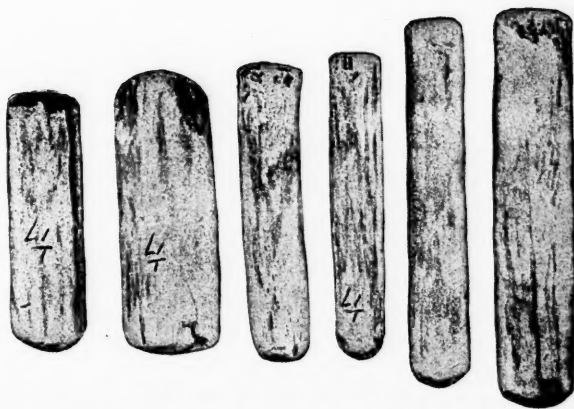


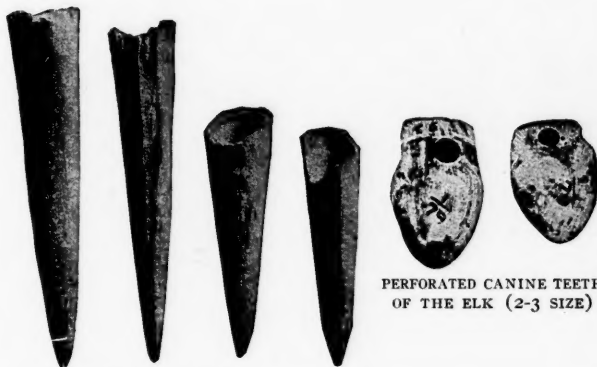
FIG. 5—REFUSE PITS AT THE GARTNER VILLAGE SITE

were found and thoroughly examined. The evidence produced by this examination shows that 20 per cent of the pits examined were originally used for storehouses for grain, beans and nuts, and perhaps for animal food. These pits were lined with straw or bark and in some instances the ears of corn laid in regular order upon the bottom; in other instances the corn was shelled and placed in woven bags; in others shelled corn and beans were found together; in others hickory nuts, walnuts, chestnuts and seeds of the pawpaw were present in goodly numbers. All this was in the charred state, accidentally caused, no doubt, by fire being blown into these pits and the supplies practically destroyed before the flames were subdued. The burning of these supplies must have been a great loss to these primitive people and may have caused them great suffering during the severe winters, but it has left a record of their industry which never could have been ascertained in any other way. The great number of pits found, which





FLAKING TOOLS MADE OF ELK HORN (2-3 NATURAL SIZE)



ARROW POINTS MADE FROM THE TINES OF  
DEER HORNS (2-3 SIZE)

PERFORATED CANINE TEETH  
OF THE ELK (2-3 SIZE)



FLINT KNIVES MADE OF RED AND YELLOW JASPER (2-3 SIZE)

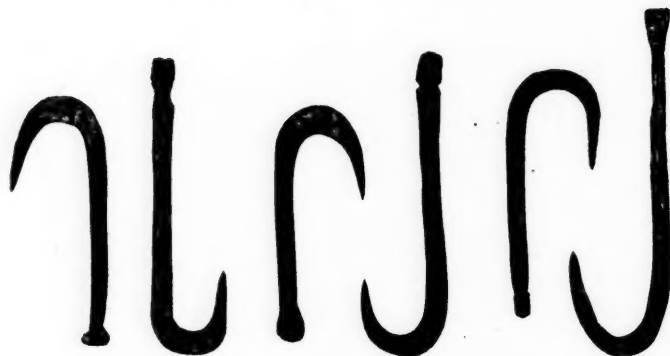


BONE AWLS. LENGTH  
 $8\frac{1}{2}$  AND 8 2-5 IN.

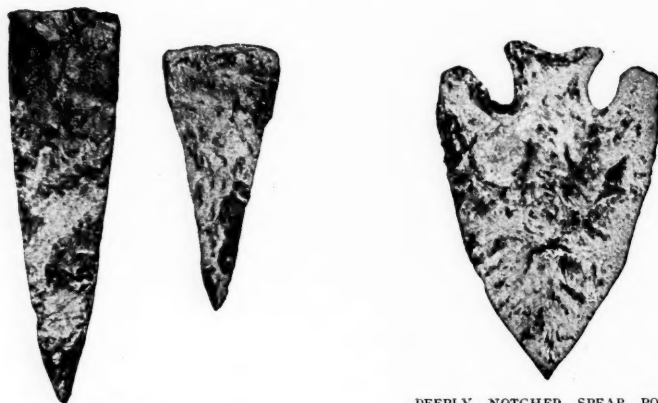


UPPER CARNASSIAL OF  
THE WOLF, GROOVED  
FOR ATTACHMENT  
(4-5 SIZE)

IMPLEMENTS FROM BAUM VILLAGE SITE



TYPICAL FISH-HOOKS FOUND IN THE VILLAGE (FULL SIZE)

LARGE TRIANGULAR SPEAR  
(HALF SIZE)DEEPLY NOTCHED SPEAR POINT,  
BLADE VERY THIN. LENGTH  
TWO AND FOUR-FIFTH IN.

show conclusively by their charred remains their early uses, would lead one to believe that all the pits found were used originally for underground storehouses and by spring time, when the supplies were likely consumed, a general forced cleaning up of their domiciles and surroundings would occur and the empty storehouse would serve as a receptacle for this refuse, which was henceforth used for that purpose until completely filled. During the autumn, when the harvest time came, a new storehouse would be dug and the grain and nuts gathered and stored for winter use. The examination of the pits has brought out the above conclusions, as evidenced by the refuse therein. Near the bottom of the pits will invariably be found the heads of various animals, such as the deer, with antlers attached, black bear, raccoon, gray fox, rabbit and the wild turkey, as well as the large, heavy, broken bones of these animals such as would likely be found around a winter camp. Further, some of the large bones showed that they had been gnawed in such a manner as to indicate the presence of a domesticated dog, whose presence was further corroborated by finding his remains in every part of the village. Therefore, taking all these facts into consideration, one must necessarily infer that the spring cleaning took place and animal bones, broken pottery and the general refuse was thrown into the pits. Further, the remains of fish are seldom ever found near the bottom of the pits, but usually occur from the top to about the middle. Mussel shells are never found at the bottom of the pits, but are usually found near the middle or half way between the middle and top of the

pit. We know that fish and mussels must be taken during the spring, summer and autumn and are certainly very hard to procure during the winter.

The bones of the old Indian dog were found in great numbers, and there is no doubt but that this dog was one of their domestic animals, for it is known that dogs were domesticated long before the earliest records of history, their remains being found in connection with the rude implements of the ancient cave and lake dwellers all through Europe. However, the history and description of the Indian dog, in the ancient times, is yet a subject far from solution. The remains of the dog found in this village site were described by Professor Lucas, of the Smithsonian Institute at Washington, as being a short-faced dog, much of the size and proportions of a bull terrier, though probably not short-haired. Professor Lucas says he has obtained specimens apparently of the same breed from the village sites in Texas and from old Pueblos. Professor Putnam, of Harvard University, for more than 20 years has been collecting bones of dogs in connection with pre-historic burials in various parts of America, and a study of the skulls of these dogs found in the mounds and burial places in Florida, Georgia, South Carolina, Ohio, Kentucky and New York, and from the great shell heaps of Maine, show that a distinct variety or species of dog was distributed over North America in pre-Columbian times. Apparently the same variety of dog is found in the ancient site of the Swiss Lake dwellers at Neufchatel, also in the ancient tombs of Thebes in Egypt. Professor Putnam further says: "This variety of dog is apparently identical with the pure-bred Scotch Collie of to-day. If this is the case, the pre-historic dog in America, Europe and Egypt and its persistence to the present time as a thoroughbred is suggestive of a distinct species of the genus *canis*, which was domesticated several thousand years ago, and also that the pre-historic dog in America was brought to this continent by very early emigrants from the old world."

He further states: "That comparisons have not been made with dogs that have been found in the tribes of the Southwest, the ancient Mexicans, and with the Eskimo."

In the latter part of the XV century Columbus found two kinds of dogs in the West Indies and later Fernandez described 3 kinds of dogs in Mexico, and as Professor Lucas has been able to trace the Baum Village dog into the far Southwest, it is very likely one of the kinds described by Fernandez. However, it must be admitted that comparisons have not been made with sufficient exactness to place the Baum Village dog with any of those described by the early writers.

During the entire exploration 50 bones of the dog were removed, representing perhaps as many individuals. Some of the bones showed marks of the flint knife upon them, others were made into ornaments, while others were broken in similar manner to bones of the deer and raccoon. Seven skulls were found, but all had been broken in order to remove the brain.

The same conditions as described above were found at Baum Village.

Another notable feature in this village was the finding of the Indian dog, and I quote from my preliminary report, page 81, Vol. X, Publication of the Ohio Archæological and Historical Society:

During the explorations at Gartner Village, which is located 6 miles north of Chillicothe, Ohio, along the Scioto river, remains of the Indian dog were found in the refuse pits similar to those at the Baum Village, and their osteological character accord in every respect with the dog found at the Baum Village site.

WILLIAM C. MILLS.

Curator, Ohio State Archæological and Historical Society.

## BOOK REVIEWS

### BRITISH AND SAXON BURIAL MOUNDS OF EAST YORKSHIRE\*

**F**OR more than forty years Mr. Mortimer has been engaged in researches of the mounds in England, especially in East Yorkshire, and in this volume is given in detail the result of his work. It is one of the most thorough, trustworthy, and clear studies of the kind ever prepared. Being beautifully illustrated by his daughter, the value of the book is much enhanced. We know of no work where details are so carefully given,—whether it is as to location, method of burial, accompaniments of ornaments, implements, weapons, or position of body. It is interesting to observe that he places cremation as being practised by the more advanced of the primitive peoples.

While these mounds or barrows show great industry on the part of the builders, there are no evidences to show that they held any intercourse with other communities, except in the matter of ornaments, which were probably fashioned by people rather more advanced than they themselves. But their weapons and implements were undoubtedly of their own manufacture.

It is a very interesting fact to notice how far-reaching these customs of burial have been. We see remains of them in Siberia, along the shores of the Mediterranean, crowning the line of hills bordering the Black Sea, where they are known as "kourgans;" in Scandinavia, where we are told they are the graves of the Vikings, in England and Ireland they are spoken of as "barrows:" and in America they appear as our Indian mounds. The custom thus seems to have been very general. Whether originating from a common point, or as being the most natural disposition, and so accidentally fixed upon, by all these various peoples remains a question. Evidently in most of them there has been some preparation for a possible hereafter, as articles for use are buried with the body. It would be a most interesting study if some one could make a close examination of characteristic ones of each group and find just what points of similarity do exist. But in the meantime we will find it very enlightening carefully to note some of the many thorough studies Mr. Mortimer has made.

\**Forty Years' Researches in British and Saxon Burial Mounds of East Yorkshire. Including Romano-British Discoveries and a Description of the Ancient Entrenchments on a Section of the Yorkshire Wolds.* By J. R. Mortimer. With over One Thousand Illustrations from Drawings by Agnes Mortimer. London: A. Brown & Sons, Ltd. Pp. lxxxvi, 452.

The form of these barrows differs somewhat,—some being long, while the greater number are round. The long barrow has a deep trough or trench on either side, from which trench the ground has evidently been taken to form the mound, and they are almost always placed on a line from east to west, the broad end being invariably to the east. The theory was advanced and held by Dr. Thurnam that this long form was the earliest one, and was used before the knowledge of metal had been introduced. He also held that these long chambers had been built by a dolichocephalous race, the round ones by a brachycephalous race, and in Scandinavia by a "round-headed and probably Turanian race."

In some parts of England, groups of two or three round mounds occur, the whole number being surrounded by a ditch or trench. Mr. Mortimer has given special attention to the mounds on the Yorkshire Wolds, and this last-mentioned form is noticed but once by him on these wolds, and that is at St. Acklam Wold, where two mounds were found to be surrounded by one trench, which was not noticeable from the surface, as the ground had been cultivated.

The barrows on the wolds are different in size and shape, varying from 15 to 125 ft. in diameter, and from a few inches to 22 ft. in height, and at Garrowby Hill there is a flat-topped mound 250 ft. in diameter, and 50 ft. in height, which has never been examined.

The material of these mounds consists of earth, chalk, and flint or stone. Occasionally bits of sod have apparently been used, and in a few instances the author even noticed the remains of grass and plants. They evidently worked from the center out, and the varying layers may often be easily traced. In not a few of those opened and examined by the author, he found clay which had been brought from some distance. In many there were evidences that cremation had been practised. Canon Atkinson found, on opening barrows on the Cleveland moors, that white sand had been used which must have been transported 7 miles. This same peculiarity has been observed in some American mounds also.

Another feature is that in almost every barrow is found a circle of flint or stone which is incomplete. The author feels inclined to think that they were designed to mark off the inclosure when first begun, and the opening was left for ingress and egress.

Still another feature of these mounds is the hole or holes which are found. They are generally circular, and are about  $1\frac{1}{2}$  ft. in diameter. In some places the bones of animals, rarely human bones, charcoal, potsherds, and burnt earth are found within them. The author's supposition that they may have been used as depositories for food for the dead is supported by the customs of some aborigines to-day. Many animal bones are found in most barrows, and they have generally been broken in order to extract the marrow, giving one grounds for supposing that they were used in funeral feasts. These are conclusive evidences, to the author's mind, that cannibalism was practised.



The number of burials in these barrows is uncertain, and the position of the bodies differs, except that they are generally placed on the south and east sides of the mounds, never on the north and west, probably with the idea of facing the sun.

The bodies were generally unprotected from the soil, though occasionally one has been found with a coffin made of a split or hollowed tree, in the manner of the one to be seen in the Scarborough Museum. One other was found at Sunderlandwick. Possibly this may be due to the difficulty of working wood with the stone tools which it is probable that they used.

However, Prof. Williamson in his account of the Gristhorpe mound, speaks of one found by "Sir R. C. Hoare, I think in the neighborhood of Stonehenge, where the body was deposited in the trunk of an elm," and another is recorded in the "*Annual Register* of March 12, 1767. It was in a barrow opened at Storbough, near Wareham, in Dorsetshire. The coffin was formed of a very large and rudely-excavated trunk of an oak 10 ft. long and 4 ft. in diameter. It contained the bones of a human body, wrapped up in a large covering of several deerskins, neatly sewn together, a part of which was ornamented with a piece of gold lace 4 in. long. Under the covering was found a small vessel of oak, of a dark color, something in the shape of an urn. The top of the coffin was even with the natural surface of the ground, the barrow raised over it."

In many places where suitable stones were not to be had, the graves had been lined with slabs of wood, though stones are known to have been carried 12 and 15 miles from Filey Brig probably. In a number of instances the burials had been made in abandoned dwellings, which in construction were not much better than animals have been known to fashion for themselves.

Instances have been found of evident cremation, though that fact does not serve to fix the date of burial, as the custom is of such remote antiquity that we are unable to trace its history. Cremation certainly was practised in the Trojan and Theban wars. Eustachius assigns two reasons why it came to be of general use in Greece. The first is because the bodies were thought to be unclean after the soul's departure, and, therefore, were purified by fire, and the second reason is that the soul being separated from the gross and inactive matter might be at liberty to take its flight to the heavenly mansions. Might not the legend of the phoenix have arisen from this idea? In some instances the ashes have been protected by urns, and in others by slabs of wood, and in some few cases the bones are found lying uncovered where the body had been burned. Pins and pieces of skin are also found in some cases, and Sir R. C. Hoare found traces of linen cloth in 6 different graves.

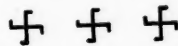
The idea that articles burned were thought to be of use after death may be found in Greek stories and histories, and it is quite possible that many primitive people held these same fancies. Both inhumation and cremation were evidently in use at the same time in



Great Britain, although the process of cremation belongs to a later period of civilization than does the former. During the Bronze age it seems to have been very common, especially in Denmark, where it was almost universal. So many of the burials in these barrows have been at different times, that it is somewhat difficult to determine accurately just where certain customs did originate.

In many barrows in various countries bodies have been found in a contracted position, for which fact many theories have tried to account. The writer of this book feels that it has been common, because, with all simple people, warmth was an object, so that they were in the habit of lying in such a position; and, being accustomed to it in life, they used it from habit in death. But a curious instance is recorded by Mr. Lukis in the Channel Islands, where the bodies were found in a kneeling position, and, judging from the remains of buttons, pins, and ornaments, it seems reasonable to infer that the bodies were often buried in their clothing. The hair of the women was often worn fastened with hairpins, but such pins have never been found in the grave of a man.

Implements or weapons have been found,—whetstones, flint knives, and scrapers of stone and bone. Implements were found made from the antlers of the red deer, but not many of them. Some bronze implements have been found, but in 80 barrows examined by Canon Atkinson only one piece of bronze was found, and that was with a cremated body. The weapons placed in barrows, however, are rarely so placed as to lead one to think they were to be used. One strange fact has been noted, and that is, that where weapons such as knife-daggers are found no traces of pottery are to be seen. These barrows in England seem to contain every stone implement which has been found elsewhere, but the same is not true of the bronze.



### HISTORY UNVEILING PROPHECY\*

Dr. Guinness writes largely from the stand-point of the historian of the interpretation of the books of Daniel and Revelation throughout the Christian Era. He especially advocates the year-day theory of interpreting the times given in these prophecies, and quotes at length from "M. de Cheseaux's account of his discovery of the astro-nomic character of the 1260 and 2300 years' prophetic periods." The accompanying diagrams apply these principles in locating the fulfillment of prophecies. He considers the prophecies of Revelation as for the most part fulfilled already, but does not go further and try to assign any time for the complete fulfillment in the Second Coming of Christ.

\**History Unveiling Prophecy, or Time as an Interpreter*, by H. Grattan Guinness, D. D. Cloth, 476 pages with appendix and 3 diagrams of the periods of time covered by prophecy, 1905. Fleming H. Revell, New York and Chicago.

## PALESTINE EXPLORATION FUND

IN the handsome volume *Painted Tombs of Mareshah* a notable discovery of inscriptions by Dr. Peters and Thiersch was told. Neither of these scholars was permanently resident in Palestine or employed in exploration, but they were well qualified to investigate the rumor of tombs discovered at Mareshah or Marissa and to copy and interpret the inscriptions. In this work of friendly coöperation they had the assistance of others, and the result was honorable to all concerned. But it is not strange that at his first leisure Mr. Macalister should wish to visit the tombs and take his turn in studying the inscriptions. This he did two years ago, and he took with him some who were experienced in examining Greek inscriptions. He was thus enabled to make some corrections in the first readings, and also to add some new inscriptions. It is to the credit of the Fund that it has gone to the expense of printing 4 pages to be inserted in the original work, so as to make it as perfect as possible, and these pages are furnished to the original purchasers.

By this revision of the inscriptions it appears that one must be read as two in one of the tombs, namely, *Katechetai*, "occupied," and *kai touto*, "and this too," meaning simply that the two loculi or cavities for bodies so marked had been filled and must not be disturbed. How plain when correctly read! And other significant phrases come out: *chaire*, "farewell;" *eirane*, "peace;" *philous*, "friends." There is a vast amount of bad Greek on tomb inscriptions in Palestine, but the meaning is not in doubt when the letters can be disciphered.

Mr. Macalister in the interval between firmans attended the annual meeting of the Fund in London and gave a good account of his work. General Sir Charles Warren presided. The deaths of Sir Charles Wilson, Canon Tristram, President Hooper of Chicago, Cunningham Geikie and others were spoken of. Mr. Macalister truly said, "We have a great record of work in the past; let us look forward to a yet greater record in the future; during the last firman the Fund put 100 pounds a month at my disposal, which enabled me to employ 80 laborers; this time I ask to be entrusted with 200 pounds a month, to be enabled to employ twice as many workmen." So may it be.

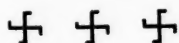
There are many inquiries about the relief maps made by Secretary George Armstrong from the ordnance survey. They are the only ones so made. They are protected by copyright. As with all our publications, books, maps, photographs, casts, etc., a reduction of price is made to subscribers of \$5.00 or more. Every map is hand finished. The larger sizes is 7½ ft. by 4 ft., the smaller 3½ ft. by 2½. The maps are shipped directly from London to the purchaser who pays

freight, etc., on delivery, in addition to the first cost, which I collect and remit to London. No duty is imposed when a map goes to a church or college which is incorporated. No map has ever been injured in transportation, or found in any way unsatisfactory. The flat maps, either in sheets, or folded on linen, or mounted to hang, are kept in stock.

THEODORE F. WRIGHT.

Honorary Secretary for the United States.

42 Quincy St., Cambridge, Mass.



## EDITORIAL NOTES

**SAXON GRAVES:**—Human remains have been recently discovered at Hawk's Hill, Surrey, England, which Mr. C. H. Read of the British Museum believes to be those of Saxons buried about the V century.

**ROMAN COINS FROM FRANCE:**—On the ancient road between Evereux and Chartres, France, an Urn, has recently been discovered containing a large number of Roman coins. These bear the heads of Julius Caesar, Marcus Aurelius, the Empress Faustina and others. There are also some medals commemorative of battles.

**RECENT DISCOVERIES AT DELOS:**—It is reported that on August 14, six large archaic lions, carved in marble, were discovered ornamenting the Esplanade near the sacred Lake of Delos. They also found a statue of the Muse Polyhymnia. The drapery of this statue is especially fine, and is said to resemble the celebrated Polyhymnia in the British Museum. A fine head of Dionysus and also a large quantity of gold jewels differing from others which have been found there, and pieces of marble and pottery have been discovered.

**ARCHAEOLOGICAL RESEARCHES IN COSTA RICA:**—The Museum at Stockholm has recently published a report on the archaeological researches in Costa Rica by C. V. Hartman. The first mound which he excavated was that of Bercedes, which is 300 m. west of Rio Novillo. This is a truncated mound, the length of whose base is 30 m. and whose top is 20 m. It is 65 m. high and surrounded by a wall of the same height. Mr. Hartman thinks that its purpose was "to serve as a platform, or temple, for the large statues, which were placed with their faces towards the rising sun." He thinks that a wooden structure, possibly with a thatched roof, crowned the summit of the mound. Four human figures and one alligator were found at the base of this mound carved in hard basaltic lava.

KNOWLEDGE OF THE "ALL-FATHER" AMONG THE EUAHLAYI TRIBE, AUSTRALIA:—In the study of the religious beliefs among the native Australian tribes there is considerable discussion as to whether their knowledge of, and belief in, an "All-Father" was derived from the teaching of missionaries or was a primitive native belief. Mr. Andrew Lang in speaking of the Euahlayi tribe says that the men are very reticent about giving the whites any information concerning their religious beliefs and their knowledge of an "All-Father." He asks the pertinent question "why should blacks be so secret about religious opinions learned from the whites?" He also calls attention to the fact that if the knowledge of the "All-Father" had been learned from the European missionaries the native women would be "at least as well instructed as the native men, but to the women the very name of the All-Father is everywhere tabooed." He further calls attention to the fact that if the Europeans had introduced the idea the young men would know more about the teachings of the "All-Father" than the old men, but the reverse is the case. The weight of evidence seems to point towards a knowledge of a creator in most if not all of the primitive tribes of Australia.

ORIGIN OF EOLITHIC FLINTS:—The discussion as to whether the Eolithic flints of Great Britain and Europe were made by man or by nature is still progressing, and to the numerous natural methods by which such flints could be produced Mr. S. H. Warren in the *Journal of the Anthropological Institute of Great Britain and Ireland*, puts forward a new and somewhat unique theory. He claims that many of the Eolithic flints were produced by water abrasion from wave action, streams, rivers and floods, but that another theory is needed to account for a large portion of these flint flakes. His new theory he calls the "Soil-abrasion" method. It is found that flakes resembling the eoliths can be produced by great pressure, especially if there is a slight grinding in connection with the pressure. Such pressure and slight grinding he claims is produced in land slides and "foundering of escarpments." Besides these more marked movements of the soil, however, he thinks that the soil creep and slight land slips due to the undermining action of water percolating through soft strata and soil, called subterranean erosion, is the more potent force in producing such flints. The pressure caused by throwing ones weight heavily on several flint pebbles is sufficient to make a blunt edged flake very closely resembling, and in some cases being identical with, the eoliths. That this was the method by which nature produced a large part of the eoliths he claims is substantiated by the fact that "pressure chipped" eoliths occur abundantly in hill-drifts of the palaeolithic age, but are rarely found in the contemporary river gravels. Mr. Warren also mentions the probability that many eoliths were produced by the drag of ice on flint pebble beds; also the "wear and tear on the surface of the ground, such as the stampeding of a herd of oxen over a bed of flint pebbles."

